

- 26 (27). Third joint of antennae in apterous viviparous ♀♀ almost twice as long as 4th ; hairs on this joint equal to one-quarter to one-third of its diameter ; hind tarsus one-third length of tibia ; hind legs three-sevenths length of body ; skin spinulose in front half of body ; colour yellow. . . . .  
*F. polonica*, sp. n.
- 27 (26). Third joint of antennae  $2\frac{1}{4}$ – $2\frac{1}{2}$  times as long as 4th ; hairs on antennae hardly noticeable.
- 28 (29). Tarsi of hind legs one-third to two-fifths length of tibia ; hind legs two-sevenths to three-tenths length of body ; hairs on legs not noticeable ; colour greenish . . . . .  
*F. pskovensis*, sp. n.
- 29 (28). Tarsi of hind legs two-sevenths length of tibia ; hind legs three-eighths length of body ; hairs on hind tibiae as long as one-quarter to three-eighths diameter of tibia ; dark transverse fasciae on 7th and 8th abdominal segments. N. America . . . . .  
*F. wilsoni*, sp. n.
- 30 (5). Hairs on body and extremities of apterous viviparous ♀♀ squamiform, arising from brown dots . . . . . Group GEOICINI.  
 Here belongs one genus, *Geoica*, Forbes, with the species *G. squamosa*, Forbes.

## Tribe SCHIZONEUREA.

- 1 (6). In apterous viviparous ♀♀ tarsus fairly distinctly separated from tibia ; antennae in viviparous ♀♀ from roots usually 5-jointed (in fundatrices 4- and 3-jointed), the longest joint being not the 3rd but the 4th ; anal sternite projecting behind the tergite and bearing on both sides several long hairs bent inwards, to which in living Aphids small drops of excrement adhere ; in alate viviparous ♀♀ 3rd joint of antennae shorter than the last three together ; median vein of front wings simple . . . . .  
 Genus *Tetraneura*, Hart.  
 (*Amycla*, Koch, *Pemphigus*, Pass., *partim*).
- 2 (5). In apterous viviparous ♀♀ with 5-jointed antennae, the last three joints almost equal in length or else the 4th longer than the others ; sometimes antennae 6-jointed ; in alate viviparous ♀♀ 3rd joint distinctly shorter than the three apical ones together.
- 3 (4). In apterous viviparous ♀♀ with 5-jointed antennae, 4th joint the longest, 3rd and 5th almost equal in length, or else 3rd slightly longer than 5th ; in individuals with 6-jointed antennae (which arise in consequence of the division of the 3rd joint into two) first three joints more or less of equal length, 4th the shortest, and 5th the longest, 6th about five-ninths of 5th ; at sides of body hairs very small, hardly visible, only on abdominal segments 6–8 do they reach 0·024–0·060 mm. ; anal tergite short and covering only a small portion of the sternite ; on both sides of anal sternite three long hairs, 0·11–0·13 mm. long ; in alate sexuparae 3rd joint of antennae  $1\frac{2}{3}$ – $1\frac{1}{2}$  times as long as 5th, 5th almost twice as long as 6th, which is almost equal to 4th. . . . .  
*T. ulmi*, DeGeer (*Amycla fuscifrons*, Koch, *Pemph. zae-maydis*, Duf., *boyeri*, Pass., *caerulescens*, Mordv., *Tetr. setariae*, Guerc., *Byrsocrypta graminis*, Schout., *Tetr. ulmisaccidi*, Patch, *T. yezoensis*, Matsumura, 1917).
- 4 (3). In apterous viviparous ♀♀ with 5-jointed antennae, the last three joints almost equal to each other ; or even 4th somewhat shorter than 5th ; at sides of body hairs fairly long, measuring 0·106–0·10 mm. on 7th and 8th abdominal segments ; anal sternite strongly projecting backwards and with only two inwardly bent hairs on each side, measuring

0.072 mm.; in alate sexuparae 3rd joint of antennae  $2\frac{1}{5}$ – $2\frac{1}{3}$  times as long as 6th and almost twice as long as 5th, 4th joint somewhat shorter than 6th . . . . . *T. rubra*, Licht. (*P. coeruleascens*, Pass., *boyeri*, Mordv.).

- 5 (2). In apterous viviparous ♀♀ antennae very short, 5-jointed, the 3rd being the shortest, and 5th longest; in alate viviparous ♀♀ 3rd joint almost equal to three others taken together. N. America . . . . .  
*T. graminis*, Monell.
- 6 (1). In apterous viviparous ♀♀ tarsus not at all or hardly separated from tibia; antennae very short, 4-jointed, 3rd joint somewhat longer than the others; anal tergite and sternite equally small and not projecting backwards; in alate viviparous ♀♀ 3rd joint of antennae equal to three-quarters to twelve-thirteenths the length of the three remaining taken together, the last three joints being almost equal in length; median vein of fore wing branching once; comparatively small species, up to  $1\frac{1}{2}$  mm. Migrants on sedge roots (*Carex*), but in N. America on *Eragrostis minor* and *Panicum*; partly hibernating on roots . . . . . Genus *Colopha*, Monell.

Here belongs only one species, *C. compressa*, Koch, 1857 (*ulmicola*, Fitch, 1859), in which the fundatrices and alate virgines-emigrantes develop in red depressed galls between the veins of leaves of *Ulmus effusa* in the Palaearctic and *U. racemosa* in the Nearctic region.

#### Tribe PEMPHIGEA.

Of this tribe several species live on roots of Graminaceae, apparently as migrants, but their connection with other species on primary host-plants has not yet been completely established. The species in most cases have been insufficiently characterised by previous authors, and often to such an extent that with some species there is no certainty that they do not belong to another tribe.

The root Aphids of the tribe PEMPHIGEA so far known from Graminaceae, including the insufficiently characterised ones, may be provisionally distinguished by the following key:—

- 1 (14). Antennae 5-jointed in apterous viviparous ♀♀ from roots.
- 2 (3). All joints of short antennae almost equal in length, last joint thicker; body bristly, white-marmorated, powdered . . . . .  
*Tychea setulosa*, Pass. (*nec* Buckton, = *Endeis pellucida*, Buckt.).
- 3 (2). Joints of antennae not equal to each other, either 5th or 3rd longer than the others.
- 4 (13). Fifth joint longer than the others or at least not shorter than 3rd.
- 5 (8). First four joints of antennae more or less equal to each other.
- 6 (7). Body oval, pale ochre yellow; on dorsal surface of body well-developed groups of glands, from which is secreted a white down. On roots of *Poa annua*; South England . . . . . *Rhizobius poae*, Buckt.
- 7 (6). Body spherical, smooth, yellowish white, slightly powdered; last three joints of antennae more or less equal in length. On roots of *Carex dioica*; South England . . . . . *Endeis formicina*, Buckt.
- 8 (5). First four joints of antennae not equal to each other.

- 9 (10). Third joint of antennae almost equal to 5th, others considerably shorter than they ; four longitudinal rows of grouped glands, better pronounced on the hind part of abdomen.\* On roots of *Panicum proliferum* and *P. glabrum* ; N. America .. .. . *Rhizobius spicatus*, Forbes.
- 10 (9). Fifth joint of antennae longer than 3rd.
- 11 (12). Third joint of antennae distinctly longer than 2nd and 4th, although shorter than the others, only slightly shorter than 1st joint or subequal to it ; tibiae somewhat longer than femora ; hairs on body and extremities not noticeable .. .. . *Tychea eragrostidis*, Pass., Buckt.†  
(= *Tychea brevicornis*, Forbes).
- 12 (11). Third joint of antennae somewhat shorter than 2nd and even the 1st, but sometimes almost equal to 1st ; 4th joint considerably shorter than the rest, almost half of the 2nd ; tibiae somewhat shorter than femora ; only the marginal groups of glands clearly visible, the pleural ones may also be partly perceptible (*Pemphigella*? p. 19, footnote) ..  
*Tychea sylvestrii*, sp. n.‡
- 13 (4). Third joint of antennae longer than the others ; body whitish yellow, with an admixture of meat-red or pink. In ants' nests and on roots of *Avena pratensis* ; South England, Belgium .. *Endeis carnosa*, Buckt.
- 14 (1). Antennae 6-jointed in apterous viviparous ♀♀ from roots.
- 15 (16). Antennae short, 3rd joint the shortest, not more than half of 2nd ; last three joints almost equal to each other. On roots of *Poa annua* ; N. America .. .. . *Rhizobius poae*, Thomas.
- 16 (15). Antennae one-quarter the length of body ; 3rd joint somewhat longer than the others, but shorter than 1st and 2nd together ; 4th joint somewhat shorter than 5th, and the latter almost equal to basal portion of 6th ; colour dirty white ; on dorsal surface six longitudinal rows of grouped glands ; length of body 2·2 mm. On roots of Graminaceae and possibly other plants ; N. America .. .. .  
" *Trama* " *erigeronensis*, Thomas.

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\* The disposition of the glands (from above only four longitudinal rows are visible, and not all six) suggests that this species may belong to the tribe SCHIZONEUREA. The settlement of this question is impossible without a more detailed description of the groups of glands.

† It may be that the N. American species (Colorado) from ant nests, *Tychea lasii*, Ckll., and *crassa*, Ckll. (Psyche, 1903) are closely related to this species.

‡ *T. pallidula*, Cockerell (Psyche, 1903) from N. America, in which the 3rd joint is longer than 1st, is distinct from this species.

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ON THE CHALCIDOID PARASITES OF PSYLLIDS (HEMIPTERA,  
HOMOPTERA).

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While engaged in working out some small lots of Psyllid parasites from various parts of the world, I have found it necessary to examine, as far as possible, the records of Chalcids which up to the present have been bred from these hosts. The literature has proved to be more extensive than had been anticipated, and it has therefore seemed well to bring together and list these scattered references when describing the forms that have been considered as new.

1. *Similarity of Coccid and Psyllid Parasites.*—In the following summary are noted 18 species belonging to the families ENCYRTIDAE (14) and EULOPHIDAE (4). Of the eight genera containing these species four at least include others which attack Coccids. In one instance indeed (*T. sicarius*, Silv.) the same species of parasite has been reared from hosts of both families (Coccids and Psyllids). In a case like this it seems probable that the *Tetrastichus* fails to discriminate between the Coccid scale and the Psyllid gall, while the general similarity between the parasites of the two host groups is doubtless to be explained on phylogenetic and biological grounds.

2. *Status.*—The Encyrtids appear to be mainly primary parasites, but the relationship of the *Tetrastichus* spp. to their hosts is less certain. They are more likely to be secondary. André was definitely of opinion that *Agonioneurus* also played this rôle.

3. *Host stage attacked, etc.*—The majority of the records, when precise on this point, agree that the pupa of the host most commonly yields parasites. André, however, found larvae attacked as well. Normally, one Encyrtid hatches from a pupa. The specimens of the *Chiloneurus* described below were found singly, free from their pupal envelopes, each resting in a depression of the host pupa, their only covering being the crust of the gall. When this had been removed, the parasite floated off easily in potash. The *Chiloneurus* larva may therefore be an external feeder, at least, in its last stage (*cf.* André's remarks on *Tetrastichus obscuratus*).

In the notices of species already described it has been thought sufficient to quote only the essential facts of the parasitism in each case and the location of the type where known, but as Bulletin No. 5 of the U.S. Dept. of Agriculture, Div. of Entomology, 1885, is now scarce, the descriptions of Psyllid parasites which it contains have been repeated *in extenso*, as well as the notes on life-histories.

Family TORYMIDAE, Walker.

The following record of a "*Callimome*" attacking a Psyllid seems to me to be open to doubt, since the Torymids, when not phytophagous, appear to parasitise mainly Dipterous or Hymenopterous hosts.

Genus **Callimome**, Spinola.

**Callimome pachyphyllae**, Vier.

*C. pachyphyllae*, Viereck, Guide to the Insects of Connecticut, iii, Hymenoptera (Bull. No. 22, State Zoological and Natural History Survey of Connecticut), Hartford, 1916, p. 516.

The reference is as follows :—

“ *C. pachyphyllae* (Ashmead). *Monodontomerus pachyphyllae* Ashmead . . . . .  
reared from the Psyllid *Pachyphylla venusta* Osten-Sacken.”

As I cannot trace any record of *Monodontomerus pachyphyllae*, Ashm., and the name appears to have existed up to 1916 in MS. only, its authorship should be credited to Viereck, not to Ashmead.

The description of the scutellum and hind femur indicate a *Monodontomerus* rather than *Callimome*.

Family ENCYRTIDAE, Walker.

Genus **Sceptrophorus**, Först.

*Sceptrophorus*, Förster, Hymen, Stud. ii, p. 34, 1856.

Genotype, *S. scepstriger*, Först.

**Sceptrophorus solus**, How.

*Encyrtus solus*, Howard, Bull. No. 5, U.S. Dept. Agric. Bur. Entom., p. 15, 1885.

Referred to *Sceptrophorus*, Förster, by Ashmead (Proc. U.S. Nat. Mus., xxii, No. 1202, p. 381, 1900).

The original description is as follows :—

“ 23. (7) *Encyrtus solus*, n. sp.

“ This species also belongs to the group of *E. strobili* (L.), and does not differ structurally from *E. trioziaphagus* to a material extent. In size and coloration it does differ quite markedly.

“ *Female*.—Length, 2 mm.; wing expanse, 4·2 mm.; greatest width of fore wing, 0·7 mm. Mesonotum somewhat more deeply shagreened than with *trioziaphagus*. Color: The basal portion of each antennal joint brown, distal portion honey-yellow; face black, with a faint bluish tinge; mesonotum black, faintly greenish; abdomen shiny black. All legs entirely yellow, except hind coxae, which are black, with a greenish luster.

“ Described from 1 ♀ specimen bred, March 14, 1879, from the gall of *Trioza magnoliae* (Ashmead), on *Persea carolinense* (Red Bay), collected at Gainesville, Fla. Its habits appear to be the same as those of the preceding species. [C.V.R. Coll.]”

*Type* ♀ in the United States National Museum.

Genus **Psylledontus**, Crawford.

*Psylledontus*, Crawford, Proc. U.S. Nat. Mus., xxxviii, No. 1730, p. 88, 3.v.1910.

Genotype, *P. insidiosus*, Crawford.

**Psylledontus insidiosus**, Crawford.

*P. insidiosus*, Crawford, *loc. cit.*, p. 89.

U.S.A.: Geneva, New York; bred from nymphs of the pear Psyllid, *Psylla pyricola*, Först. (*P. J. Parrott*).

*Type* in the United States National Museum.

**Psylledontus secundus**, Gir.

*P. secundus*, Girault, Ann. Ent. Soc. Amer., viii, No. 3, p. 281, Sept. 1915.

CEYLON: Peradeniya; from gall-making Psyllids (nymphs) (*A. Rutherford*).

*Type* in the United States National Museum.

Genus **Psyllaephagus**, Ashm.

*Psyllaephagus*, Ashmead, Proc. U.S. Nat. Mus., xxii, No. 1202, p. 382, 1900.

Genotype, *P. (Encyrtus) pachyphyllae*, How.

**Psyllaephagus pachyphyllae**, How.

*Encyrtus pachyphyllae*, Howard, Bull. No. 5, U.S. Dept. Agric. Bur. Entom., p. 15, 1885.

The original description is as follows :—

“ 24. (8) *Encyrtus pachyphyllae*, n. sp.

“ This species is closely related to *E. trioziophagus*. The minute spines at the distal end of the posterior tibia, opposite the tibial spur, are longer and more curved than with *trioziophagus*. The coloration differs in that with *pachyphyllae* the tibiae and tarsi are all light honey-yellow, and the flagellum of the ♂ antenna is light brown. The ♂ antenna also differs from that of *trioziophagus* in that joints 1, 2, and 3 of the funicle are fang-shaped instead of 2, 3, and 4. The dimensions on the average are the same in both species, although *pachyphyllae* is quite variable in the ♀.

“ Described from many ♂ and ♀ specimens bred, between May 5 and 10, 1884, from galls of *Pachyphylla celtidis-gemma*, Riley, collected in Southern Maryland. [Dept. Agr. and C.V.R. Coll.]”

*Type* in the United States National Museum.

**Psyllaephagus trioziophagus**, How.

*Encyrtus trioziophagus*, Howard, Bull. No. 5, U.S. Dept. Agric. Bur. Entom., p. 14, 1885.

The original description is as follows :—

“ 22. (6). *Encyrtus trioziophagus*, n. sp.

“ *Female*.—Length, 1.3 mm. ; wing expanse, 2.9 mm. ; greatest width of fore wing, 0.51 mm. Antennal scape stout, short, not reaching to top of the eyes, with no foliation below ; pedicel short, conical, as thick as long and not exceeding in length the first funicle joint ; joints of funicle hard to distinguish, somewhat flattened and subequal in length, sixth as broad as long ; club subfusiform, as long as three preceding funicle joints together. Antennal grooves deep ; two slight malar impressions ; clypeus and vertex covered with fine punctures, lower face smooth, eyes wide apart ; ocelli form a very obtuse-angled triangle. Mesonotum delicately shagreened, with slight, sparse punctures, each giving rise to a short, delicate hair ; no marked difference between scutum and scutellum in punctuation ; axillae just meet at tips. Wings perfectly clear ; marginal vein wanting ; stigmal one-third longer than postmarginal. Abdomen nearly circular, sunken in center. Color : Flagellum of antennae brown ; scape and pedicel black, with a greenish luster ; lower part of face with a brilliant purplish-blue luster ; clypeus and vertex dark coppery-brown ; pronotum, coppery ; mesonotum bright shining green, the scutum somewhat more brilliant than the scutellum ; metanotum and abdomen shining black, with a dark green luster ; all coxae and femora dark green, honey-yellow at tips ; front tibiae honey-yellow, greenish at base ; middle tibiae entirely honey-yellow, sometimes with a slight green spot near base ; hind tibiae green, honey-yellow at either end ; front and hind tarsi brownish ; middle tarsi yellow.

“ *Male*.—Length, 1 mm. ; wing expanse, 2.5 mm. ; greatest width of fore wing, 0.5 mm. Differs from ♀ chiefly in the antennae. The flagellum is much flattened ; scape still shorter than in ♀ ; pedicel very short and insignificant ; joint 1 of the funicle twice as long as wide, and three times as long as pedicel ; joints 2, 3, and 4 are fang-shaped dorsally ; joint 3 more acute than 2 and 4 ; joints 5 and 6 resemble joint 1 in size and proportions ; club short and suboval. Abdomen short and subcordate in form.

“ Described from 4 ♀'s and 2 ♂'s bred, November 7, 1881, from the galls of the Psyllid *Trioza diospyri* (Ashmead), on the Persimmon (*Diospyros virginiana*) on the Department grounds at Washington.

"This species is markedly different from *Encyrtus triozae*, André, bred by M. Ed. André from *Trioza centranthi*, Vallot, and described in Ann. Soc. Ent. France, 1878, p. 84; but belongs to the same group of the genus *Encyrtus* as *E. strobili* (L.), to which it is quite closely related. *E. strobili*, however, preys upon certain gall-making Cecidomyids, as *Cec. rosaria* and *C. salicina*.

"A single *Encyrtus* issued from a single *Trioza* in every case, making its way through the dorsum of the abdomen of its host. [Dept. Agr. and C.V.R. Coll.]"

*Type* in the United States National Museum.

### **Psyllaephagus metallicus**, Gir.

*Aratus metallicus*, Girault. (I cannot trace this species under *Aratus*.)

*Psyllaephagus metallicus*, Girault, Mem. Queens Mus., iv, p. 119, 4.vi.1915.

• AUSTRALIA: Queensland, Brisbane; bred out of *Eucalyptus*, 5.viii.1911, gall no. 15 (*H. Hacker*).

*Type* ♀ in the Brisbane Museum.

### **Psyllaephagus femoralis**, Bor.

*P. femoralis*, Borelli, Bull. Soc. Entom. Ital., li, p. 32, 1919 (published 25.vii.1920).

ITALY: near Bologna; from galls of *Trioza alacris*, Flor., on *Laurus nobilis*, L.

*P. femoralis* oviposits in both larvae and pupae of its host and is an internal feeder.

### **Psyllaephagus cellulatus**, sp. nov.

♂, ♀. A metallic green species with pale anterior legs and a conspicuous incomplete sub-basal band on the hind tibiae.

♀. Vertex of head and thoracic notum dark metallic green, with aeneous reflections. Frons of a rich dull metallic violet, with the dark green colour reappearing between the toruli and continuing towards the mouth-edge, which is aeneous green. Sternopleurae more aeneous than the notal surface. Tegulae pale, infuscated on apical third. Abdomen purplish black and at most submetallic. Wings hyaline. Mentum and stipes blackish-brown. All the palpi, galea, lacinia and ligula conspicuously pale. Antenna, bulla, scape (except narrowly at apex) and pedicel dorsally, blackish brown; apex of scape and sometimes pedicel ventrally towards its apex, a little paler; the remainder of the antenna pale, the funicular segments more or less faintly infuscated but always sharply contrasted with the scape. Legs with all the coxae like the thorax and submetallic; fore and mid legs entirely pale, the fore femora at most faintly infuscated on proximal half; hind trochanters and extreme base of femora pale; thereafter the femora black or blackish-brown, with the apical sixth pale; base of tibia pale to about the length of the corresponding apical area of the femora, followed by a broad dark spot (most distinct dorsally), which forms a nearly complete band extending to over one-third from the base; remainder of tibia and tarsus pale. (In none of the tarsi is the last joint very appreciably darker than the others, but the specimens have all been in spirit.)

♂. The green of head and thorax is more emerald. Frons concolorous with vertex. Bulla and scape very pale, paler than funicle, only the pedicel is definitely blackish-brown on the proximal two-thirds, its apex (transversely) being pale. In the hind femur the apical third is pale, and the sub-basal band is less extensive, being reduced to a spot on the dorsal edge.

♀. *Head* nearly one-fourth wider than deep. Toruli (2:1) mainly below the base line of the eyes, relatively as far apart as in the ♂, but only about two-thirds their length from the mouth-edge. Antenna (fig. 1, c), length 0.6 mm.; 12 (11)-jointed; scape (9:2) thrice as long as and of the same breadth as the pedicel



(8:3). The funicular joints increase in length gradually, 11, 13, 15, 16, 16, 17, with breadths respectively 11, 12, 13, 14, 16, 18. The club is three-fourths the scape in length, or equal to the sum of the first four or the last three and a half funicular joints. Sensoria, 0, 1, 2-3, 3, 3, 4-5, and in club segments 5-6, 7, 5.

*Thorax.* Pronotum with a posterior row of about 30 bristles; axillae not quite touching. Scutellum with about 50 (25:25) bristles.

*Wings.* Fore wings, length, 0.93 mm.; breadth, 0.41 mm.; submarginal, radius (fig. 1, *a*) postmarginal, 10:2:1. The punctiform marginal is much broader than long (fig. 1, *a*), submarginal vein with about 11 bristles. Submarginal cell,

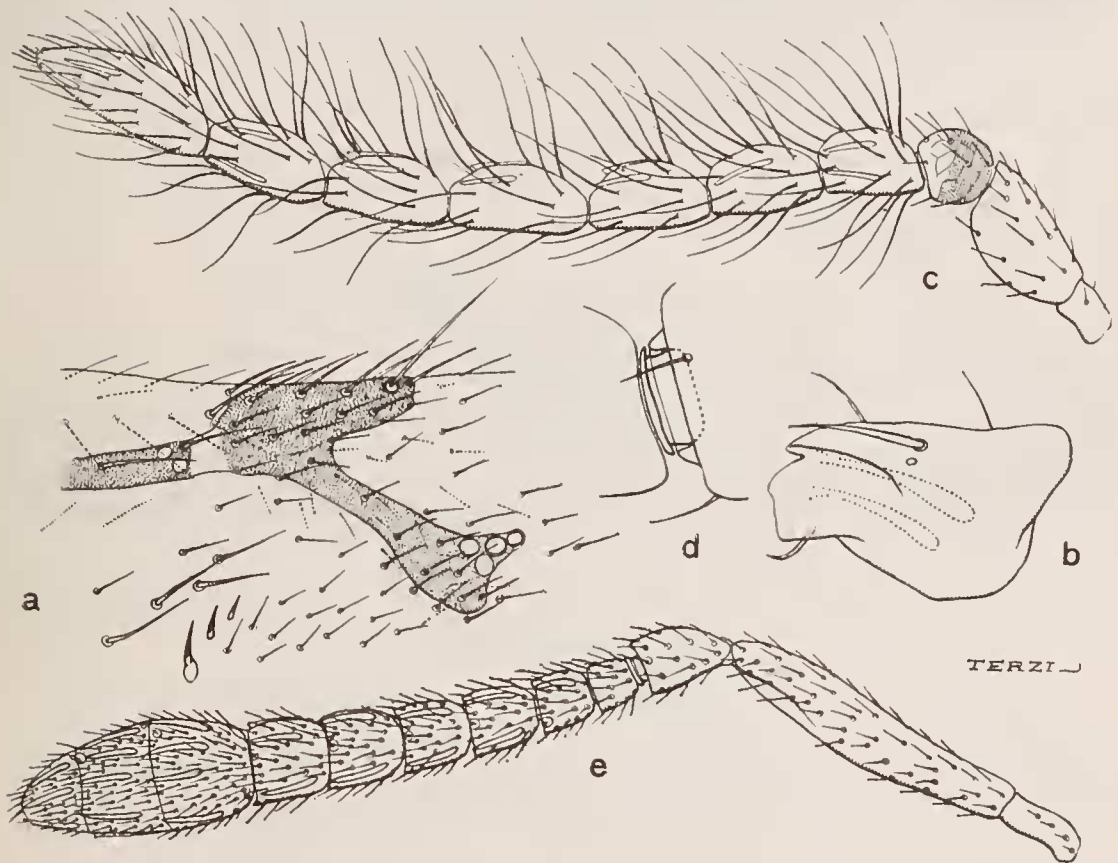


Fig. 1. *Psyllaephagus cellulatus*, sp. n.: *a*, radius of ♀; *b*, mandible of ♀; *c*, antenna of ♂; *d*, ring-joint of same; *e*, antenna of ♀.

upper surface near edge with a row of about 20 minute bristles. Ventral surface entirely covered with minute fine bristles (about three rows), about six of which towards the apex are much longer. Hind wings, length, 0.6 mm.

*Legs.* Fore legs with coxa (4:3) coarsely reticulate; femur (3:1) one-twelfth longer than the tibia (4:1), which is broad; upper tooth-like apical angle of tibia well developed, apical comb of six spines; comb of first tarsal joint with about 14 spines; tarsus 15, 10, 10, 9, 16. Mid leg tibia at one-third from base nearly ten, at apex about six times as long as broad; apical teeth 7, on tarsal joints 1-4: 8, 5, 3-4, 1-2; tarsus 23, 14, 11, 10, 15. Hind leg with coxa 10:11; femur (27:8) shorter (4:5) than tibia (6:1); apical comb of tibia with 20 spines; 10-11 spines along postero-ventral edge of first tarsal joint; tarsus, 21, 13, 11, 18.

*Abdomen* with pattern on tergites rather coarse and a little raised. Tergite 1 the longest, occupying over one-fifth of the length. Tergites 2-4 show antero-medially

an uncoloured membranous area, concealed for the most part beneath the posterior edge of the preceding tergite. At the extreme side of their dorsal portion the tergites show one or more strongly marked cell-like chitinisations (fig. 2, *a*). Spiracle small, circular. Stylet with three major and two minor bristles, the longest four-fifths the distance between the processes themselves. Free portion of ovipositor sheath one-fourth of the base.

*Length*, 1.4 mm.; *alar expanse*, 2.4 mm. (In the largest ♀ the length is 1.6, *expanse*, 2.7; *fore wing*, 1 mm.)

♂. *Head* one-fifth wider than long (deep); eyes occupying two-thirds of the depth, separated at the level of the anterior ocellus by half and at the base line by seven-ninths of the greatest width. Toruli (3:2) lying mainly above the base line of the eyes; separated ventrally by nearly twice or from the mouth-edge by nearly one

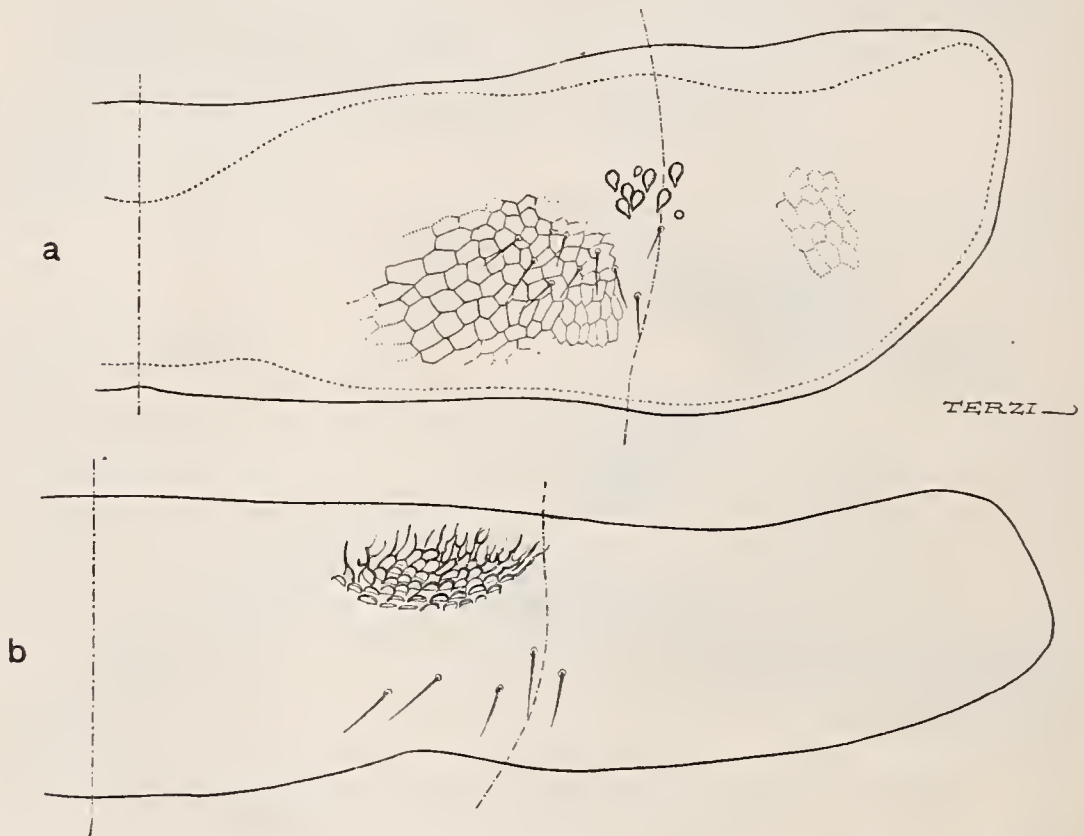


Fig. 2. Right half of second tergite of (a) *Psyllaephagus cellulatus*, sp. n.; (b) *Encyrtus pulvinatus*, sp. n.

and a half times their length. Whole surface with rather fine strongly raised pattern and numerous short bristles, of which over 30 stand on the combined inter- and infra-torular areas, four of them above the straight clypeal edge being a little longer. Antenna (fig. 1, *c*), length, 0.7 mm.; 9 (10)-jointed; scape (2:1) more than twice (7:3) as long as and a little broader (7:6) than the pedicel (1:1). The latter nearly circular, with an extremely coarse reticulation. Ring joint (fig. 1, *d*) very minute, nearly concealed in the pedicel. The first two joints of the funicle together about one-fourth longer than the scape, or one-eighth longer than the club. The proportions of the funicle joints and club are: length, 26, 27, 28, 32, 32, 32, 50; breadth, 17, 18, 18, 17, 16, 17, 19. The club is solid; tubular hairs numerous, as in fig. 1, *c*. Labrum narrow, faintly concave, nearly straight, with five bristles; mandible as in fig. 1, *b*; maxillary palpi, 9, 9, 9, 20; labial palpi, 11, 6, 10.

*Thorax.* Pronotum with 20–22 bristles in the posterior row. Mesonotum with the scutum pattern fine, strongly raised. Axillae not touching. On the scutellum the cells are more drawn out and equally raised. Whole mesonotum with numerous short bristles, of which upwards of 30 (15–17 : 15–17) stand on the scutellum. Metanotum and propodeon rugulose; pleurae of propodeon beyond the spiracle with numerous bristles. Spiracle broadly oval—the long axis transverse.

*Wings* similar to those of ♀. Submarginal cell with only 2–3 longer bristles apically, and only about two rows of minute bristles on underside on apical half.

*Legs* similar to those of ♀.

*Abdomen.* The thickened cells at the side of the tergites are much less numerous, *c.g.*, in the second tergite only two such cells occur on each side (*cf.* fig. 2, *a*),

*Length*, 1.3–1.4 mm.

*Type* ♀ in the British Museum, one of a series of 3 ♂, 7 ♀; alar expanse, a little over 2 mm.

From *Rhinocola populi*, Laing, attacking *Populus euphraticus*.

MESOPOTAMIA : Baghdad, Beled Ruz, 16.vi.1920 (*Y. Ramachandra Rao*).

#### Genus **Encyrtus**, Dalm.

*Encyrtus*, Dalman, Svensk. Vet.-Akad. Handl., xli, p. 147, 1820.

That either of the following species is in the strict sense an *Encyrtus* is debatable. With André's species I have no direct acquaintance, and so have left it as the author placed it. *E. pulvinatus*, sp. n., differs from the other *Encyrtus* spp. known to me mainly in its type of colour pattern, somewhat shorter marginal vein and its mandibles. It may represent a new genus, but little inconvenience should result from its present placing. In any case its final position cannot be fixed till the male is known.

#### **Encyrtus triozae**, And.

*E. triozae*, Ed. André, Ann. Soc. Ent. France, (5) viii., p. 84, 26.v.1878.

FRANCE : Côte-d'or.

From galls of *Trioza centranthi*, Vallot, on *Centranthus angustifolius*, D. C.

André states that *E. triozae* is an internal feeder on both larvae and pupae, but to the description itself he appends merely the words "habitat in pupis *Triozae centranthi*, Vallot."

#### **Encyrtus pulvinatus**, sp. nov.

♀. A dark metallic (?) green species, with conspicuously pale legs. The second tergite of the abdomen is characteristic. Body dark green, the scutellum matt. Antennae very pale brown, a little darker on scape, pedicel (dorsally) and club. Wings faintly but completely brown-tinted. Fore legs (including coxae) entirely pale, except for the fifth tarsal joint, which is infuscated as in the mid and hind legs; mid legs pale except for faintly brown coxa and fifth joint of tarsus; in the hind legs the coxa (except near the trochanter) and the distal two-thirds of the femur are brown, the rest pale.

*Note.*—The general body colour may have altered a little in alcohol but it appeared to be mainly dark green. The clear spot between the marginal and submarginal veins is indistinct.

♀. *Head* broader than long (deep) (9 : 8); eyes half as long again as the genal space, sparsely pilose, separated at their nearest by three-fifths the width of the head. Toruli elongate (2 : 1), about their own length from the mouth-edge, distinctly below the base line of the eyes, separated ventrally by one and a half times and

above by a little more than their length, scape hollow, as long as the toruli; whole face above the grooves strongly raised reticulate. Two bristles on clypeus and about seven on each side of the inter-torular area; 4-5 bristles on each side in a group below the anterior ocellus, besides the usual orbital bristles (12-15). Labrum simple, transverse, very slightly concave, with six stout spinose bristles. Mandibles similar, no distinct teeth (fig. 3, *b*). Maxillary palpi, 8, 4, 5, 11, the third joint with four bristles, the fourth with nine, of which three are apical; galea with 5-6 marginal bristles and 18-20 on the upper flap; labial palpi, 7, 4, 6, the second joint with two bristles, the third with five. Antenna (fig. 3, *a*), 0.7 mm. long; scape (9:2) not greatly expanded (three times as long as the pedicel (9:5) or one-third longer than the club, or just longer than the pedicel, ring joint and first three funicular joints taken together) with besides the usual superficial bristles one long externally sub-apical and ventral and a ventral row, about six, on the inner aspect. Funicular joints and segments of club, measured ventrally, in ratio 16, 15, 15, 22, 22, 22—22, 20, 18, with breadths 12, 12, 14, 15, 18, 20—25, 22. Joints 4-6 of the funicle bear 2-3 sensoria each, and on the club segments there are 4, 4, 2.

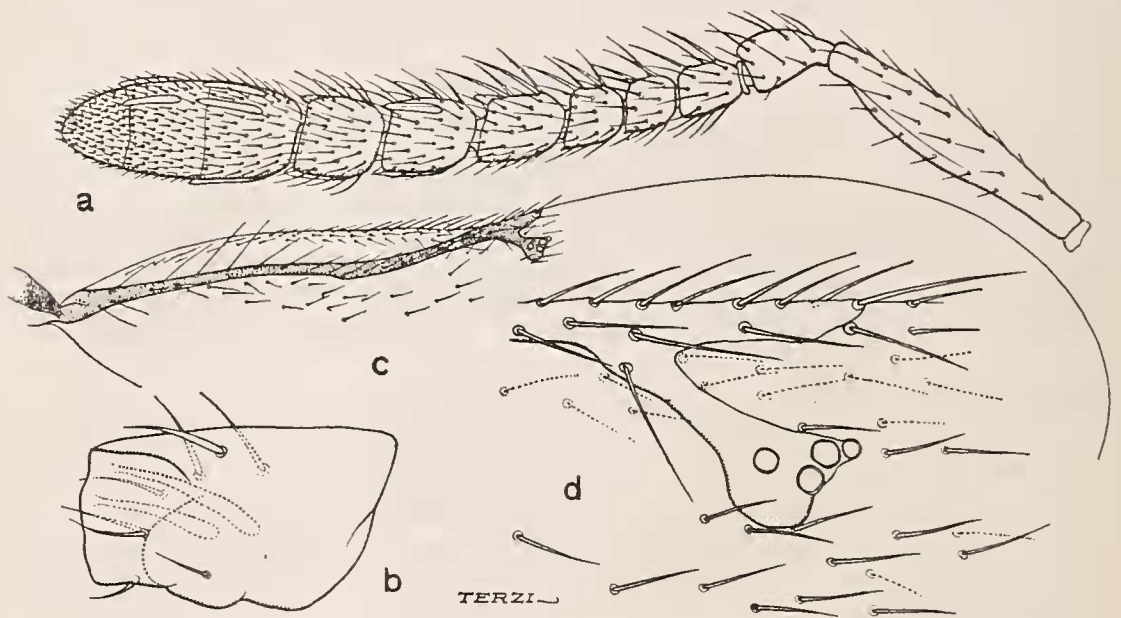


Fig. 3.—*Encyrtus pulvinatus*, sp. n., ♀: *a*, antenna; *b*, mandible; *c*, neuration; *d*, radius.

*Thorax*. Mesonotum scaly reticulate, pattern fine, raised, with 70-80 bristles. Axillae not quite meeting. Four bristles. Scutellum matt, pattern coarser and strongly raised in front of the sensory pustules, but a little smoother behind; the latter area has four bristles (2, 2), while there are about 25 bristles anteriorly on the rougher area. Mesopleurae anteriorly striate-reticulate, posteriorly reticulate, as is also the sternal area. Propodeon medianly smooth, laterally striate; spiracle at antero-lateral angle; metasternum medianly finely pitted and rough (strongly and deeply raised reticulate).

*Wings*. Fore wings (fig. 3, *c, d*), length, 1.25 mm., a little more than twice (40:19) as long as broad. Submarginal, marginal, radius, postmarginal 19:2:3:2. About 14 bristles on the submarginal, eight along the edge of marginal and postmarginal and as many more on the veins themselves, and on the radius towards the base; 5-6 rows of discal cilia between the "hairless line" and the base of the wing. Hind wings, 0.8 mm. long.

*Legs.* Fore coxae (5 : 3) with numerous bristles on outer aspect, about two-thirds as long as the femur (22 : 5) which is a little longer (11 : 10) than the tibia (5 : 1); tibial comb with 5-6 spines, comb of first tarsal joint 10-11 spines. Mid legs with femur (about 15 : 2) as long as the tibia, which is very narrow (about 12 : 1) medianly but more expanded (about 6 : 1) at the extreme apex, where there are four heavy spines; on first tarsal joint four spines in a lateral row, followed by two transverse rows (subapical and apical) of three each, joints 2-4 with transverse apical row of 3-4 spines and one extra on plantar aspect; the tibial spur is just longer than the first tarsal joint measured ventrally. Hind legs with coxa as broad as long, with about 25 rather long bristles externally; femur (about 17 : 4) shorter (8 : 9) than tibia (6 : 1), comb with 12-14 spines, longer spur not half the first tarsal joint; the latter with 6-7 spines along the ventral edge; in the tarsi of all the legs the third and fourth joints are subequal and the first half as long again as the second.

*Abdomen* one and a half times as long as broad from above. The tergites are medianly nearly smooth, with slightly raised pattern on the overlaps and posteriorly from about the level of the stylets. Tergites 1-3 are band-like and comparatively simple, the second bearing anteriorly at each side a small patch (occupying rather less than one-fourth of the dorsal breadth of the tergite) of highly raised minute cells, which doubtless give a foothold to the ♂ (fig. 2, *b*); tergite 4 is narrow, band-like medianly, subconcave along the posterior edge, and deeply and roundly excised between the tergal and pleural regions; tergites 5 and 6 are postero-medianly convex with nearly separated triangular overlaps; spiracle small, broadly oval; tergite 7 is truncate trapezoidal, the sides converging posteriorly. Each tergite 1-6 bears 4-5 bristles at each side with a bare space between, but on the sixth the row is continuous; on the overlaps of 1-4 there is at most one bristle, of tergite 5 about half a dozen, of tergite 6 about 10; on tergite 7 there are upwards of 30 bristles. Medianly the entire venter is densely set with bristles. The free portion of the sheath is less than one-third of the base.

*Length*, about 1.4 mm.; alar expanse, about 2.8 mm

*Type* ♀ in the British Museum.

Bred from *Trioza citri*, Laing, attacking *Citrus*.

KENYA COLONY: Kabete, 1920 (*F. W. Dry*).

#### Genus *Chiloneurus*, Westw.

*Chiloneurus*, Westwood, Phil. Mag., iii, p. 343, 1833.

#### *Chiloneurus praenitens*, sp. nov.

♀. A small species, with pale head and thorax and dark abdomen. The scape is greatly dilated.

Head, propodeon and abdomen shining, thorax dull. Head and thorax mainly clear light brown (honey-coloured), eyes chocolate coloured; antennae as in fig. 4, *a*. Pronotum with a minute dark spot at each lateral angle and a large one antero-medianly above the neck, occupying two-fifths of the breadth and three-fifths of the length. The posterior dark band on the mesoscutum is completely transverse and occupies about one-fourth of the length. Propodeon darker than the rest of the thorax. Fore and mid coxae very pale, those of the mid legs faintly embrowned. Legs otherwise pale, with the following exceptions: fore femur (narrowly) above, mid femur shortly preapically (very faintly) brown, a dark spot superiorly near base of the tibia. Heavy tarsal spines all pale. Hind legs with femur dorsally, indistinctly and faintly, darker; tibia with two faint spots, one at one-third, the other at two-thirds, apex of tibia very pale. Fore wing practically hyaline as far as the uprise of the submarginal to the marginal, *i.e.*, the radical spot is nearly absent; the

cloud is concave distally, about one-ninth of the wing apically being clear. Hind wing hyaline. Abdomen, dark brown, with bluish or violet metallic reflection. Ovipositor pale.

*Head* (fig 4, *b*) wider than deep—about 6 : 5 when viewed from in front at right angles to the transverse ridge between the upper surface (vertex and frons) and the lower frons (scapal hollows and inter-torular area). Upper orbits practically parallel, the frons at its narrowest (halfway between the anterior ocellus and the ridge) rather less than one-fourth the width of the head. Upper frons smooth, its pattern fine and hardly raised. Ocelli in an equilateral triangle; the posterior pair widely separated, each being less than a diameter from the orbit and from  $1\frac{1}{2}$ –2 diameters from the occipital edge. Inter-torular area smooth and declivous about the mid line, but without a definite carina or edge. Antenna (fig. 4, *a*), 0.65 mm. in length; scape (16 : 7) greatly expanded, widest above the middle, longer than the club, two and a half times as long as the pedicel, which is equal to the first three funicular joints together; the first funicular is quadrate, the rest transverse; club only a little shorter (9 : 10) than the funicle, and though much swollen hardly as broad as the scape. Mouth-parts: labrum normal, transverse, short, distinctly concave, with six bristles (3, 3); mandibles (14 : 9) tridentate; maxillary palpus, 13, 9, 9, 8.

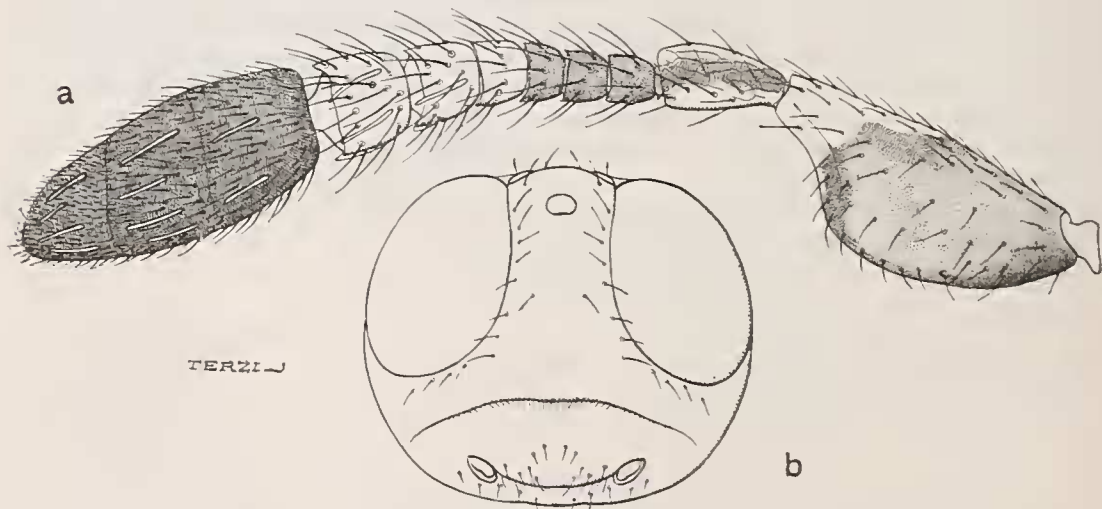


Fig. 4. *Chiloneurus praenitens*, sp. n.: *a*, antenna; *b*, head.

*Thorax*. In the mesonotum the anterior two-thirds (*i.e.*, up to the dark band) bears about 30 dark bristles, and the surface is entirely covered by a moderately fine raised rugose striation—the striae being straight and subparallel. The dark band is covered by the usual belt of sword-like hyaline bristles, which lie parallel to one another and overlapping, and produce by interference the silvery play visible in this region. There are about three rows of these peculiar bristles. Scutellum with deeply raised reticulation. Axillae with five bristles.

*Wings*. Fore wings (5 : 2), length, 0.9 mm., submarginal vein (about five times the marginal) bearing five dark and two hyaline bristles before the uprise, on the marginal stand 18–20 dark stout bristles and about half a dozen project at the edge from the numerous bristles below. Radius with one bristle near base and one near apex. Behind the submarginal the wing is nearly bare, there being only 3–6 fine hyaline bristles opposite the two similar bristles on the nervure and about 15 short stout dark bristles in 2–3 irregular rows on the basal side of the “hairless line.” On the submarginal cell below are 10–12 minute hyaline bristles on the basal two-thirds and 2–3 darker and longer ones at the apex. Hind wings (4 : 1), length, 0.75 mm.

*Legs.*—Tarsal joints 1 and 2 in ratio 21 : 15. Mid legs, tibia with five spines at apex ; tarsal joints 1 and 2 in ratio 35 : 20 ; the spines on joints 1-4 are 11-12 : 4 : 3 : 3.

*Length*, 1.3-1.4 mm. ; alar expanse, 2.1-2.3 mm.

*Type* ♀ in the British Museum ; one of a series of four taken from galls of a Psyllid (? *Trioza* sp.).

JAMAICA : Hill Gardens, 9.ii.1921 (*C. C. Gowdey*).

This species belongs to the *formosus*, Boh. (1852) *cyanonotus*, Waterst. (1917), *dactylopii*, How. (1885), section of the genus. It should be easily recognised by its small size, colour, and antennal characters.

The following genus is, as a rule, placed in a subfamily (SIGNIPHORINAE) of the ENCYRTIDAE.

Genus **Signiphora**, Ashm.

*Signiphora*, Ashmead, Orange Insects, p. 30, 1880.

Genotype, *Signiphora flavopalliata*, Ashm. (*l.c.*).

**Signiphora noacki**, Ashm.

*S. noacki*, Ashmead, Proc. U.S. Nat. Mus., xxii, p. 410, 1900

BRAZIL : San Paulo.

From *Psylla* sp. on a wild shrub, bred October 1897 (*F. Noack*).

*Type* ♀ in the United States National Museum.

**Signiphora unifasciata**, Ashm.

*S. unifasciata*, Ashmead, Proc. U.S. Nat. Mus., xxii, p. 411, 1900.

U.S.A. : Florida, Georgiana (*Dr. Wittfield*).

From *Ceropsylla sideroxyli*, Riley.

*Type* ♀ in the United States National Museum.

Of the following species I know nothing at first hand : *Agonioneurus*, Westwood (1833), is a synonym of *Aphelinus*, Dalm. (1820), but (from description) I am doubtful whether André's insect really belongs here.

**Agonioneurus pictus**, And.

*Agonioneurus pictus*, Ed. André, Ann. Soc. Ent. France, (5) viii, p. 85, 26.v.1878.

FRANCE : Côte-d'or.

From galls of *Trioza centranthi*, Vallot, on *Centranthus angustifolius*, D.C.

Bred from the same larvae that gave rise to *Encyrtus triozae*, And., and considered by André to be probably a hyperparasite.

Family PTEROMALIDAE, Walker.

Genus **Pachyneuron**, Walker.

The species described below runs down to *Pachyneuron*, Walker (Ent. Mag., i, p. 371, 1833) of which genus, however, it is not a typical exponent, differing as it does from *P. formosum*, Walk. (*loc. cit.*, p. 380) in the shortened first funicular joint.

**Pachyneuron crassiculme**, sp. nov.

♀. Head and thorax black, with at most faint violet submetallic reflections. Abdomen blackish-brown, not quite so dark as the rest of the body, with submetallic reflections only on the two basal tergites. Antennae blackish-brown, a little paler on

club and base of scape. Trophi blackish-brown; palpi white, except the basal joint of the maxillary, which is a little infuscated. Wings, hyaline. Coxae black, of the hind legs submetallic on outer side; all trochanters and fore tibiae pale, as are also the tarsi, of which the fifth joint is definitely infuscated only in the hind legs. Femora more or less infuscated on basal two-thirds (in the front pair mainly ventrally) and pale apically. In the mid and hind tibiae the basal one-seventh or one-eighth and the distal half are pale, the remainder being more or less infuscated, particularly dorsally.

*Head* (fig. 5, *a*) with surface evenly raised, reticulate and shining; towards the mouth-edge the pattern is drawn out; edge of clypeus with three lobes, the middle one somewhat broad (fig. 5, *a'*) but more pointed when seen from in front.

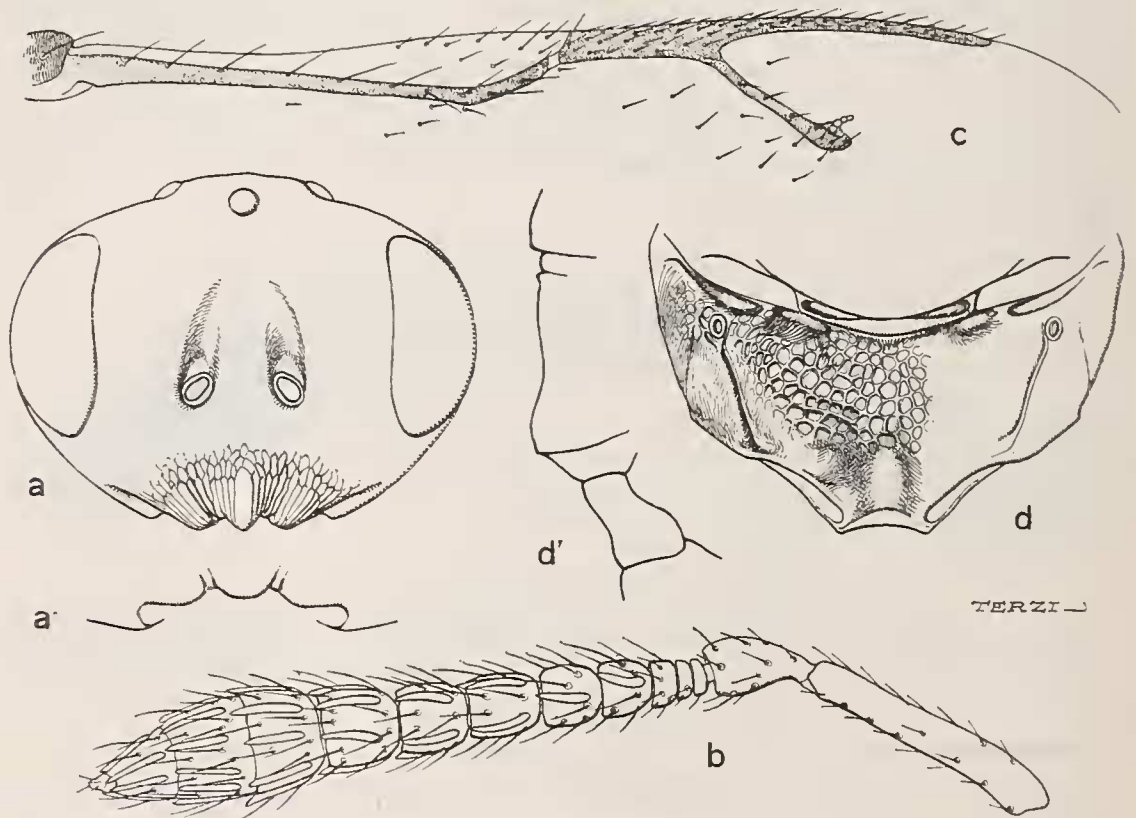


Fig. 5. *Pachyneuron crassiculme*, sp. n., ♀: *a*, head; *a'*, mouth-opening; *b*, antenna; *c*, neuriation *d*, propodeon; *d'*, propodeon and petiole in profile.

Antenna (fig. 5, *b*), length, 0.52 mm.; scape (5 : 1) widest near base, two and a half times as long as the pedicel (barely 2 : 1) and as long as the funicle up to the middle of its penultimate joint (*i.e.*, equal to ring joints and four and a half subsequent joints) and one-fifth longer than the club; the two ring joints and the first and second funicular joints together as long as the pedicel; the first funicular very short (1 : 2) and ring-like, and only half as long as the second, which is quadrate, as is also the third; the fourth joint cylindrical and about one-half longer than the third, being just longer than the fifth and as long as the sixth, which is the broadest in the funicle; the lengths of joints 1-6 approximately 5½, 11, 11, 15, 14, 15, and the breadths, 10, 11, 12, 14, 14, 16; the club longer than the three preceding joints together and much wider (11 : 8) than the last funicular joint, segmented in ratio 14 : 16 : 18, with breadths of 22 and 16; the funicular joints have the following sensoria 0, 2, 2, 4, 4, 6, and the club, 7, 9, 7. Mandibles both quadridentate, the teeth deeply separated. Maxillary palpi, 7 : 10 : 10 : 20; labial palpi, 12 : 3 : 12.



*Thorax.* Pronotum completely margined; parapsidal furrows distinct anteriorly and traceable backwards to nearly one-half; general surface shining, but evenly reticulate, most raised on mid lobe. Propodeon (fig. 5, *d*) with spiracle small, oval; lateral fold distinct, nucha short and shining; entire surface reticulate, but raised and a little dull, broadly, in the middle; the sides, though reticulate, are smooth and shining. Petiole short and rather deep, about half the length of the propodeon (fig. 5, *d'*).

*Wings.* Fore wings (fig. 5, *c*), length, 0.83 mm., two and a quarter times as long as broad; submarginal, marginal radius and postmarginal approximately 14:5:5:8; the radius more exactly is about one-tenth longer than the marginal, the latter being much thickened and varying from five (at the junction with the submarginal) to four and a half (at the origin of the radius) times as long as broad; the radial knob is narrower than the marginal, and near its origin the vein itself attains to only one-third of the greatest width of the marginal. Chaetotaxy: submarginal with 9-10 bristles, 6-7 (stouter) at the edge of the marginal, and about a dozen fringing the postmarginal; on the broad surface of the marginal are about 25 bristles in roughly three rows; 6-7 on the radius; on the postmarginal (apart from the fringing bristles) there are about 30 more in two irregular rows. The fringe is short and the distal ciliation not very dense; on the distal half of the subcostal cell are 9-10 short bristles near the edge ventrally. Hind wings, length, 0.66 mm.

*Legs.* Fore legs, coxa (7:4) with coarse raised reticulation on outer aspect, half as long as the trochanter and femur combined; femur (30:7) just longer (18:17) than the tibia (6:1), which is as long as the tarsus excluding the unguis; on the tibia the spur is at one-seventh from the apex, with three spines between it and the lower ventral angle, two more on outer lateral aspect apically and two on inner face subapically; comb of first tarsal joint with 10 spines; tarsus 24, 16, 13, 11, 20. Mid legs, tibia (11:1) about one-fourth longer than femur (11:2); tarsus 27, 21, 17, 13, 22. Hind legs, femur (21:5) shorter (7:8) than tibia (8:1); apical comb of tibia with 10 spines, spur two-thirds of first tarsal joint; tarsus 30, 24, 18, 15, 24.

*Abdomen.* Smooth, shining, nearly as long as head and thorax together; post-petiole segment occupying rather less than one-third of the length, ovipositor hardly at all projecting. The petiole (fig. 5, *d'*) is very short.

Length, 0.75 mm.; alar expanse, 1.8 mm.

Type ♀ in the British Museum.

From *Rhinocola populi*, Laing, attacking *Populus euphraticus*.

MESOPOTAMIA: Baghdad, Beled Ruz, 16.vi. 1920 (*Y. Ramachandra Rao*).

#### Family EULOPHIDAE, Westw.

#### Genus **Tetrastichus**, Hal.

*Tetrastichus*, Haliday, Trans. Ent. Soc. Lond., iii, p. 297, 1843.

Genotype, *T. (Cirrospilus) Attalus*, Wlk.

#### **Tetrastichus obscuratus**, And.

*T. obscuratus*, Ed. André, Ann. Soc. Ent. France, (5) viii, p. 83, 26.vi.1878.

FRANCE: Côte-d'or.

From galls of *Trioza centranthi*, Vallot, on *Centranthus angustifolius*, D.C.

Commenting on the finding of this *Tetrastichus*, André remarks: "Le parasitisme est donc incontestable, et de plus il se produit extérieurement au moins en partie, puisque la nymphe n'est pas contenue dans l'insecte dévoré."

**Tetrastichus sicarius**, Silv.

*T. sicarius*, Silvestri, Boll. Lab. Zool. R. Sc. Agr. Portici, ix, p. 325, figs. lxxiv-lxxv, 20.ii.1915.

KENYA COLONY: Songhor.

"Reared from heavily parasitised Citrus *Psylla*," 2 ♂, 4 ♀, ix.1917 (*F. W. Dry.*).

This species has also been bred from several African Coccids (various localities) and from *Lecanium viride* in Mauritius.

**Tetrastichus dryi**, sp. nov.

A blackish species without strong metallic reflections, with a conspicuous pale basal spot on the abdomen (♂) and somewhat extensively pale legs. The ventral sensorium of the scape short—much less than the breadth of the scape. The funicle with whorls of long tubular bristles.

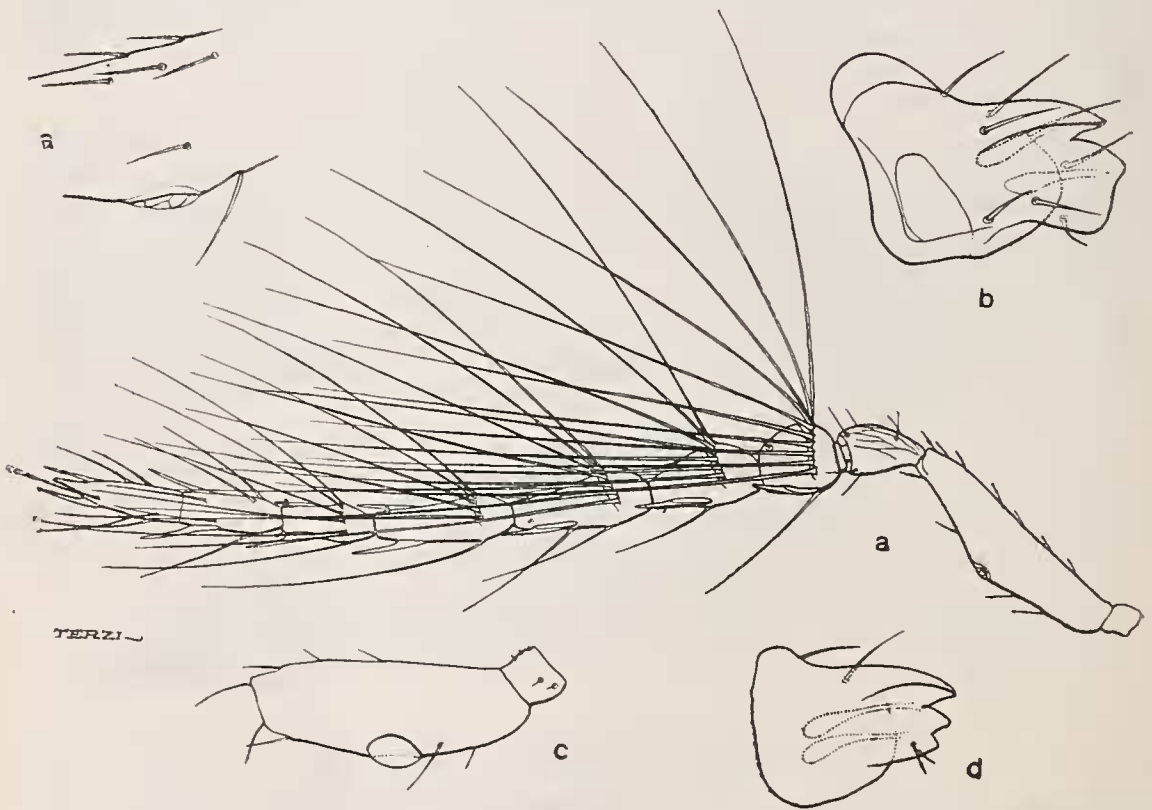


Fig. 6. *Tetrastichus dryi*, sp. n., ♂: a, a, antenna, and scapal sensorium enlarged; b, mandible. *Tetrastichus maculifer*, Silv., ♂: c, scape and sensorium; d, mandible.

♂. Body and coxae blackish, the pale abdominal spot extending over the apical third of tergite 1 and about two-fifths of the breadth, across tergite 2 and just touching on tergite 3 anteriorly. Antennae uniformly but not deeply infuscated, except for a paler median stripe on the scape. Trophi like antennae. Nervures distinctly pale brown. Fore and mid tibiae and all the tarsi pale—the fifth joint of the latter only faintly embrowned; fore femora a little embrowned basally (more particularly dorsally) and becoming gradually paler near the apex; mid femora pale brown, hardly lighter at apex; hind femora and tibiae uniformly brown, the latter of a lighter shade.